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Japanese Laid-open Patent Application (KOKAI) 1994-327643

**【TITLE OF THE INVENTION】** A Method of Displaying Analytical Results  
of an Automatic Cardiogram Analysis Apparatus and a Device therefor

**【CLAIMS】**

**【Claim 1】**

A method of presenting result of analysis performed on a cardiograph analysis device, the device comprising:

means for converting cardiograph signals induced from electrodes mounted on a living body into digital signals;

means for performing measurement of waveforms of the digital cardiograph signals by digital signal processing;

means for classifying measurements of cardiograph waveforms output from the measuring means into cardiograph findings; and

means for displaying or storing the cardiograph findings and the waveforms of the cardiograph signals,

wherein a degree of abnormality of the cardiograph finding is set as a quantified value using the cardiograph findings, and

wherein the degree of abnormality quantified by the judging means is displayed on the display means or being stored in the storage means in order to display the degree of abnormality of cardiograph findings quantitatively.

**【Claim 2】**

A cardiograph analysis device, comprising:

means for converting cardiograph signals induced from electrodes mounted on a living body into digital signals;

means for performing measurement of waveforms of the digital cardiograph

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signals by digital signal processing;

means for classifying measurements of cardiograph waveforms output from the measuring means into cardiograph findings; and

means for displaying or storing the cardiograph findings and the waveforms of the cardiograph signals,

the device further comprising;

a table for storing scores response to all the cardiograph findings capable of being classified correspondingly to each of the findings, and

judging means for referring the table and for setting from the cardiograph findings as a quantified value using the cardiograph findings,

wherein the degree of abnormality quantified by the judging means is displayed on the display means or being stored in the storage means in order to display the degree of abnormality of cardiograph findings quantitatively.

#### **[DETAILED DESCRIPTION OF THE INVENTION]**

**[0001]**

**[Field of the invention]** This invention relates to a method of presenting result of analysis performed on an automatic cardiograph finding analysis device in which the degree of abnormality of cardiograph findings is displayed by means for quantifying cardiograph abnormality out of classified cardiograph findings and displaying or storing quantified abnormality therein, and an automatic cardiograph finding analysis device functions under the presenting method.

**[0002]**

**[Conventional art]** Result of analysis on an automatic cardiograph finding analysis device includes measurements such as cardiac rates obtained through measurement and amplitude and time duration of P waves, QRS

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complex, and T waves, cardiogram findings obtained by analysis, comments and recommendations indicating future therapeutic strategy. These are displayed together with waves of conventional 12-lead cardiogram. There may be a case in which judgement obtained by classifying cardiogram abnormal in five grades is added on the display.

[0003]

**[Problem to be solved]** Measurements, name of findings, comments so on displayed as result of the analysis may be understood only to physicians, clinical technologist so on who have medical knowledge. The five-grade classification does not accelerate early detection of physical abnormality because such classification does not catch tiny changes in cardiogram abnormal and its trends.

[0004] It is an object of the present invention to solve the above stated problems and to realize the method for presenting result of analysis performed on a cardiograph analysis device and device itself capable of recognizing degree of physical abnormality appears on cardiogram.

**[Means for solving the problem]**

[0005] The method of presenting result of analysis performed on a cardiograph analysis device, the device comprising:

means for converting cardiograph signals induced from electrodes mounted on a living body into digital signals;

means for performing measurement of waveforms of the digital cardiograph signals by digital signal processing;

means for classifying measurements of cardiograph waveforms output from the measuring means into cardiograph findings; and

means for displaying or storing the cardiograph findings and the waveforms

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of the cardiograph signals,

wherein a degree of abnormality of the cardiograph finding is set as a quantified value using the cardiograph findings, and

wherein the degree of abnormality quantified by the judging means is displayed on the display means or being stored in the storage means in order to display the degree of abnormality of cardiograph findings quantitatively.

**[0006]** The cardiograph analysis device, comprising:

means for converting cardiograph signals induced from electrodes mounted on a living body into digital signals;

means for performing measurement of waveforms of the digital cardiograph signals by digital signal processing;

means for classifying measurements of cardiograph waveforms output from the measuring means into cardiograph findings; and

means for displaying or storing the cardiograph findings and the waveforms of the cardiograph signals,

the device further comprising;

a table for storing scores response to all the cardiograph findings capable of being classified correspondingly to each of the findings, and

judging means for referring the table and for setting from the cardiograph findings as a quantified value using the cardiograph findings,

wherein the degree of abnormality quantified by the judging means is displayed on the display means or being stored in the storage means in order to display the degree of abnormality of cardiograph findings quantitatively.

**[0007]**

**[Function of the invention]** The degree of cardiogram abnormality can be displayed in more detail because such abnormality determined according to

cardiograph findings is displayed or stored quantitatively.

【0008】

【Embodiment of the invention】 Subsequently, an embodiment of the present invention will be described with reference to the attached drawings.

【0009】 Fig. 1 is a block diagram of an embodiment of the present invention. The embodiment comprises electrocardiograph amplifiers 1<sub>1</sub> ~ 1<sub>10</sub> amplifying cardiograph signals, a multiplexer 2 to which outputs of the amplifiers are input and one of which being output therefrom, a main memory part 4 to which the output of the multiplexer 2 is input and it converts such output into digital signals, a derivative calculation part 5 interconnected to the main memory part 4, a measuring part 6, a diagnosis part 7, a judging part 8, a storage part 10 and a display part 9 performing display in accordance with output signals of the main memory part 4. The main memory part 4 displays on the display part 9 the result obtained through communications among each part mutually connected one another.

【0010】 Control of the each part is performed by an control device alone (not shown) under a predetermined control program. The operation of which will be described below.

【0011】 Electrocardiograph signals lead with 6 electrodes (none shown) disposed on the four limbs and two on the chest are respectively amplified by the amplifiers 1<sub>1</sub> ~ 1<sub>10</sub> and are switched by the multiplexer 2. Thereafter, such signals are sequentially input to the A/D converter 3 and being stored in the main memory 4 as digitized electrocardiograph signals.

【0012】 Subsequently, the digitized electrocardiograph signals are output to the derivative calculation part 5. Such derivative calculation part 5 is for storing conventional 12 lead-electrocardiograms, the derivative calculation

part replaces input signals into one of the stored 12 lead-electrocardiograms and output it to the main memory 4. The main memory 4 temporary stores a 12 lead-electrocardiogram converted by the derivative calculation part 5 and outputs it to the measuring part 6.

[0013] The measuring part 6 comprises a wave form measurement function and measures amplitude and time duration of P waves, QRS complex, T waves of conventional 12 lead-electrocardiograms being input. The measurements thus measured are output to the main memory 4. The main memory 4 temporary stores the measurements being input and then outputs them to the diagnosis part 7.

[0014] The diagnosis part 7 categorizes cardiogram findings in accordance with a diagnosis program contained in the above-stated control program and outputs the name of findings to the main memory 4. The main memory 4 temporary stores the cardiogram findings being input and outputs them to the judging part 8.

[0015] The judging part 8 quantify degrees of unusualness of cardiograms as scores in accordance with a judging program contained in the control program and the cardiogram findings being input and outputs them to the main memory 4. The main memory 4 temporary stores the quantified scores being input, and then the conventional 12 lead-electrocardiograms, the measurements, the name of the findings and the scores are displayed on the display part 9 and store them into the storage part 10.

[0016] Fig. 2 is a flow chart showing a procedure for judging carried out at the judging part 8. Fig. 3 is a diagram illustrating an example of a score display and that of a recording thereof which is calculated by the judging part 8. A judging procedure performed by the judging part 8 according to the flow

chart of Fig. 2 will be described below.

[0017] The judging part 8 sets initial score as a perfect score 100 points when the judging part 8 starts judging procedure as a result of being input a cardiogram finding from the main memory 4 (step S11). Subsequently, a table of the main memory 4 in which scores corresponding to classified findings are stored is referred and then an appropriate score is subtracted from the current score (step S12). The scores corresponding to classified findings are all stored in the table (such as 10 pints for Ventricular premature beat, 25 points for a possibility of Myocardial Infarction so on). Then the process proceeds to step 13 (the end of the process) after confirmation of executing step 12 for all the classified findings.

[0018] The main memory part 4 generates image display signals shown in Fig. 3 according to the score thus calculated in the process, and displays an image on the display part 9, as well as stores the signals to the storage part 10.

[0019] In the above description, the table in which scores corresponding to classified findings are stored therein is installed in the main memory 4, such table may be installed in the judging part 8, the installation position is not specified in certain places.

[0020]

**[Advantages of the present invention]** As described in the above, the method of presenting result of analysis performed on the automatic cardiograph finding analysis device permits a person who has not much medical knowledge differs from healthcare professionals such as physicians, clinical technologist so on to recognize the degree of cardiogram abnormal by displaying or storing the degree of cardiogram abnormal in a quantified form.



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In addition, the trend of cardiogram abnormal degree can be recognized by carrying out regular medical checkups.

**【Brief description of the drawings】**

**【Fig. 1】**

FIG. 1 is a block diagram illustrating structure of an embodiment of the present invention.

**【Fig. 2】**

FIG. 2 is a flowchart showing a procedure carrying out by the judging part illustrated in Fig. 1.

**【Fig. 3】**

FIG. 3 is a diagram illustrating an example of a score display and that of a recording thereof

**【Description of the reference numerals】**

- 1 . . . . electrocardiograph amplifiers
- 2 . . . . multiplexer
- 3 . . . . A/D converter
- 4 . . . . main memory part
- 5 . . . . derivative calculation part
- 6 . . . . measuring part
- 7 . . . . diagnosis part
- 8 . . . . judging part
- 9 . . . . display part
- 10 . . . . storage part

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**【Abstract】**

**【Object】** It is an object of the present invention to provide an apparatus and a method both capable of easily generating diagrams for manufacturing wiring harnesses.

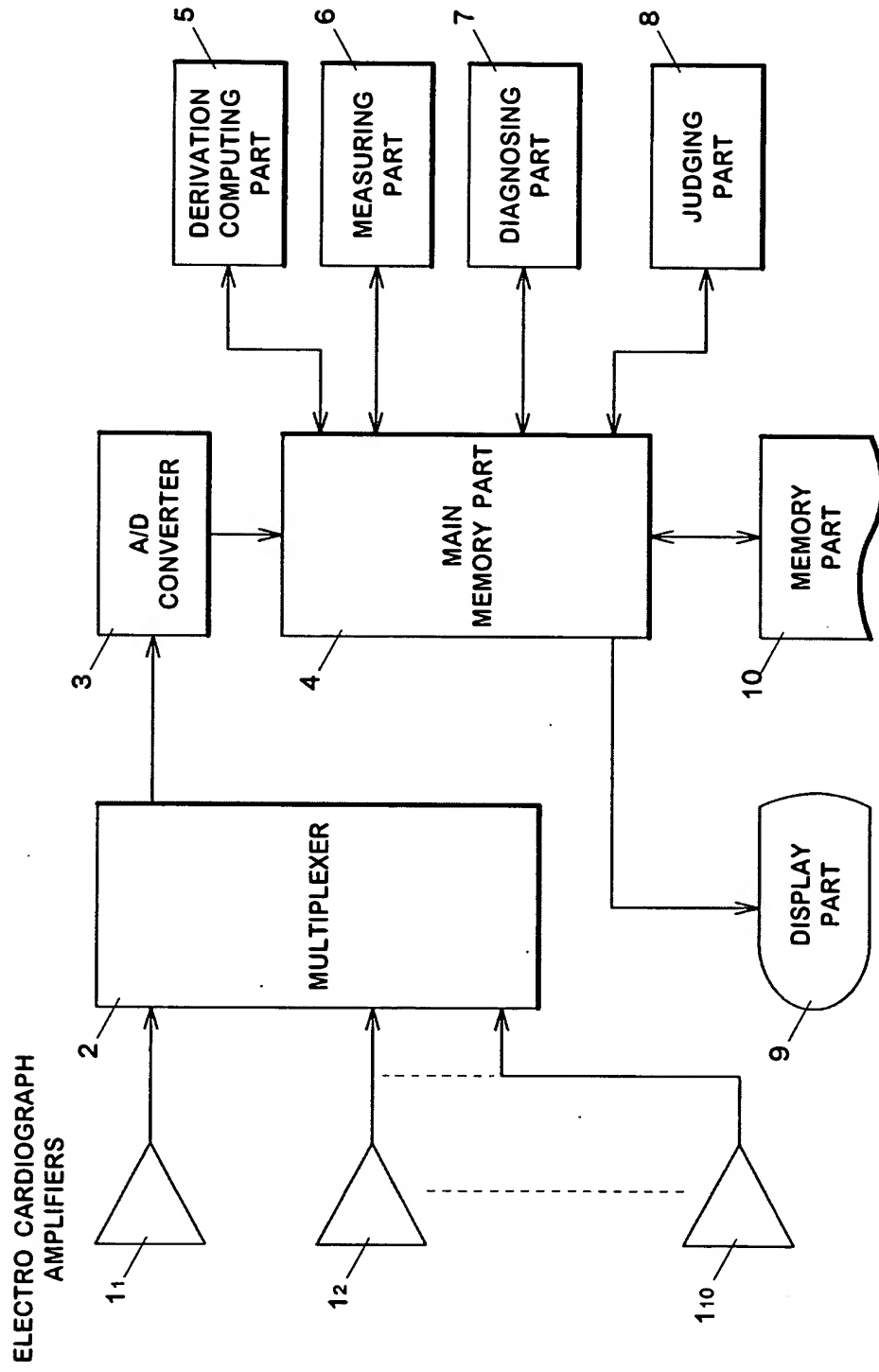
**【Means to achieve the object】** A method of presenting result of analysis performed on a cardiograph analysis device, the device comprising:

means for converting cardiograph signals induced from electrodes mounted on a living body into digital signals; means for performing measurement of waveforms of the digital cardiograph signals by digital signal processing;

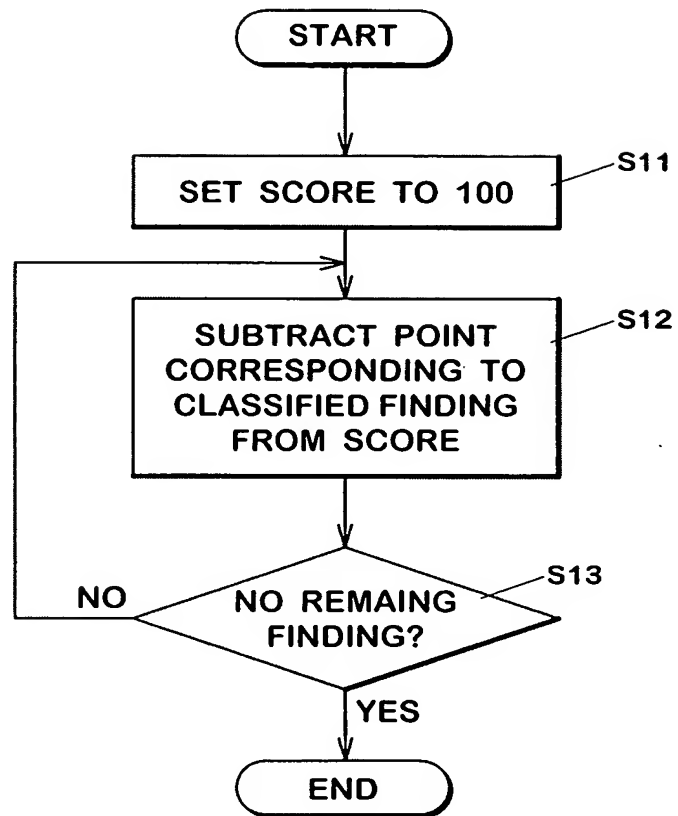
means for classifying measurements of cardiograph waveforms output from the measuring means into cardiograph findings ; and means for displaying or storing the cardiograph findings and the waveforms of the cardiograph signals, wherein a degree of abnormality of the cardiograph finding is set as a quantified value using the cardiograph findings, and wherein the degree of abnormality quantified by the judging means is displayed on the display means or being stored in the storage means in order to display the degree of abnormality of cardiograph findings quantitatively.

**【Selected figure】** Fig. 1

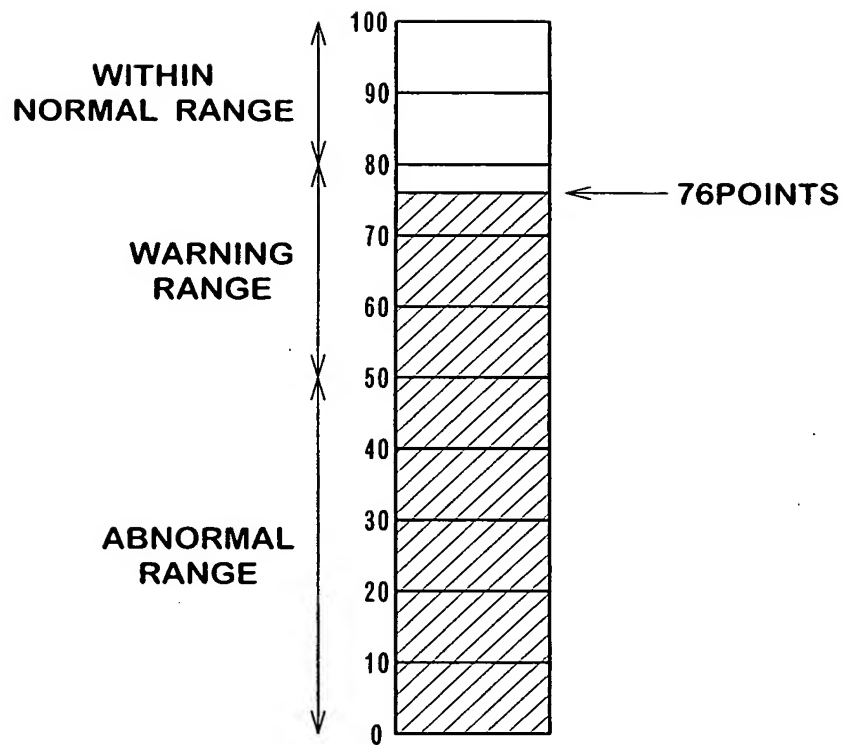
FIG.1



**FIG.2**



**FIG.3**



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